Adaptation and transformation of human setting from Middle Holocene to Early Bronze Age in south-eastern Arabian Peninsula

MAURIZIO CATTANI

University of Bologna

Abstract

This paper is a tribute to the forerunners scholars that devoted their research to the prehistory of Arabia. In particular, Serge Cleuziou and Maurizio Tosi, who staked on the investigation of the most extreme point of eastern Arabia and enlightened the way to carry out the research to many others (Tosi 1989; Cleuziou, Tosi 2007).

Their main effort was made to introduce this region as a wide history of land, people and culture with several concepts and directions of the research of an outermost place among ancient civilizations of Near and Middle East.

The aim of this paper is to illustrate the framework of the evolutionary path from the sixth to second millennium BC keeping on mind some keywords: adaptation to local (arid) environment; resource exploitation; social and economic options; interactions; trade and exchange; sharing technology.

Keywords

Oman, Middle Holocene, Bronze Age, settlement, graveyard

1. Introduction

The geographical and geomorphological conditions of South-Eastern Arabia can be resumed in three main elements: a central mountain chain raising up to 3000 m; the desert inland extending to the west in the Rub' al-Khali; the coast on the Gulf and the Indian Ocean on the eastern side (fig. 1). The rocky ridge, generally marking a boundary, is here a sort of cohesive force to link and unify different environmental features thanks to high availability of water. The region is included in the subtropical zone of arid climates with an average of rainfall well below the 250 mm conventionally marked as the limit of aridity[1], but all around the mountains a widespread string of aquifers and springs always represented the attraction of an increasing population, especially during the period between the sixth to fourth millennium BC.[2]

Another form of attraction was at the same time the seaside, as source of wealth with endless resources (molluscs and fishes), well testified by several shell middens investigated in the last decades. These corresponds probably to seasonal campsites for small groups of food foragers mainly nourished by fishing, gathering and hunting with a few goats and cows aside in the Middle Holocene. The similarities in funerary rituals and in material culture made of flint and stone tools or shell hooks extending from the Gulf in north-west to the seashore of Ja'alan show a continuous texture of identical form of adaptation and cultural meanings that allow to propose a common path and a shared nature: presumably their force was in the mechanism of coordination, in which all peoples have contributed and benefited from interactions with their neighbours. Archaeological record from Oman is strongly confirming the shaping of "social groups inextricably involved with other groups in weblike interconnections in which technologies are diffused and modified by other groups caught up in these same processes".[3]

[1] Annual rainfall remains very low, ranging from 171 mm at Nizwa to 36 mm at Sohar.

[2] Climate in the considered period varies from wetter conditions until Fifth millennium BC to slightly more arid during the Fourth millennium BC.

[3] Kohl 2008, p. 495.

2. The early phase

The formative process during the Middle Holocene, between 6000 and 3000 BC can be illustrated by some of the excavated sites by the Italian Archaeological Mission in Oman in almost forty years of intensive explorations,[4] like RH-5 and RH-6 at Ras al-Hamra – Qurum in the Capital Area of Muscat and KHB-1 at Ra's al-Khabba on Ja'alan coast. All of them located on the coast are better preserved than anywhere in the interior thanks to the dumps of collected shells that consolidated the archaeological deposit and preserved the prehistoric remains in much better conditions. They also resume the possibility to understand the complexities of a small community group that struggled to survive exploiting new resources.

The sites of RH-5 and RH-6[5] are two middens made of shells and fishes located on the junction of a tertiary calcareous terrace (Ra's al-Hamra) with the sand beaches of Batinah, where the estuary of wadi Aday creates a wide mangrove swamp (Qurum Nature Reserve). The sites allow to go back in Middle Holocene dating respectively between the end of the fifth and the fourth millennium BC (RH-5) and between the mid-sixth millennium BC and mid-fifth millennium BC (RH-6). The particular location allowed to exploit mangrove biomass, collecting shells like oyster (*Saccostrea cucullata*) and *Terebralia palustris*, as well as to for gathering wood. From the coast they exploited marine resources fishing and collecting other sea shells.

The importance of these two sites, investigated since early '80s of last century with other campaigns in recent times, is marked by information on the dwellings of the settlement and especially on one of the most extended and ancient graveyard of the Arabian Peninsula.[6]

In both sites the archaeological deposit up to 2 m thick made of overlapping layers of shell and fish remains, contains dozens of huts and several structures (fireplaces, dump and waste pits, oven) used for cooking and processing fish and shells) with

[4] Frenez, Cattani 2019.

[5] Biagi, Salvatori 1986; Biagi 1987.

[6] Coppa et Al. 1985; Salvatori 2008.

Figure 1
Ecological zones and the wild animal populations of Oman (from Cleuziou, Tosi 2007: fig. 1.10)

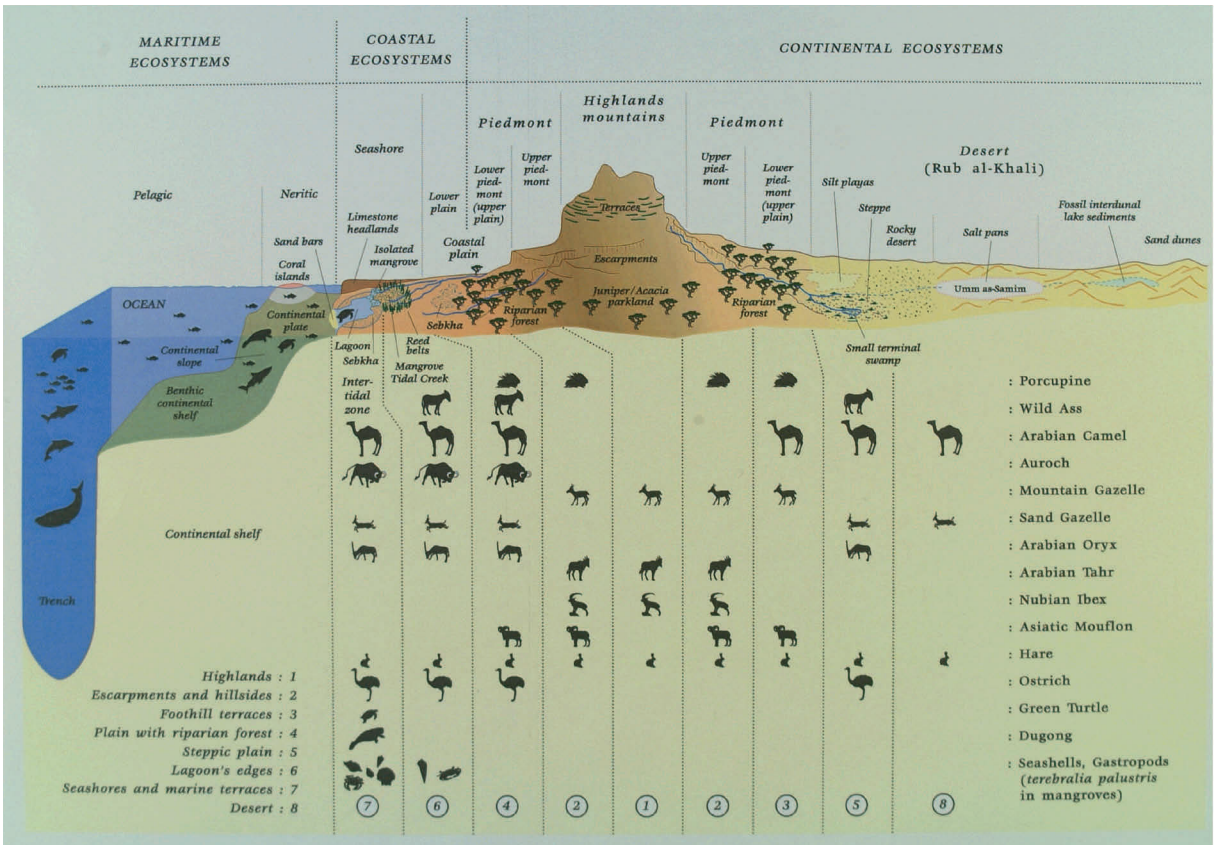


Figure 2
Ra's al-Hamra RH-5. View of the site with settlement and graveyard extensions (L.G. Marcucci)

Figure 3
RH-5 graveyard.
Reconstruction of grave 411, a man has covered with layers of turtle bones, fish bones and shells
(from Munoz 2008)

abundant objects of daily life. The material culture describes the typical coastal prehistoric site with working of stone, shells and bones for manufacturing ornaments, as well as for items related to fishing and to hunting activities. From RH-6 a flint arrowhead and some stone adzes, small globular net sinkers with a continuous incision or with pecked grooves around the waistline and the flat ones with notches at the end of the major axis, mark the early fishing activities cutting stone tools, grooved stones, grooved chlorite discs, shell scrapers (*Veneridae*), multi-functional tools, an earring and rectangular beads in chlorite.

The huts, ovals or circulars, were recognized by post-hole alignments or narrow trench foundation with few postholes inside.

In both sites the excavations confirmed and enlarged the size of a graveyard which was in use between 3800 and 3300 BC at RH-5 and in the first quarter of the fourth millennium BC at RH-6. Thanks to almost five hundred graves of their inhabitants the cemetery represents the most extraordinary archive of human records, where it is possible to analyse DNA and markers of diseases and pathologies, identify eating habits and rituals of death for ancestors' cult, and finally tentatively to reconstruct the society of these prehistoric fishermen.[7]

The burials are mostly individual, placed in shallow and oval pits lying on one side in a crouched position with the arms bent and the hands placed in front of the head (fig. 3). In one part of the cemetery multiple and secondary burials were found as well, suggesting potential changes in funerary customs. Among personal items found in the burials there were personal ornaments such as necklaces, bracelets, earrings, pins made from local stones and shells, and much rarely objects of common use such as shell fishhooks, bone awls and net weights. In some cases, the burials contained a shell valve (*Callista sp.*), while two graves were covered with a whole carapace of sea turtle (*Chelonia mydas*).

Current analysis on the anthropological remains are demonstrating a character of genetic isolation of the local community marked especially by the extremely high incidence of *spina bifida occulta*, a malformation of one or more vertebrae that resulted in

[7] Coppa et Al. 1990.

painful scoliosis and deformity of feet. Life expectancy scarcely reached 20 years, since almost 25% of the individuals died between 20 and 25 years, while less than 15% of the population reached 40 years. The discovery of a shark tooth arrowhead still embedded into the sacral vertebra of an adult male buried in the large collective grave clearly indicates the evidence of a warfare event.

Among several sites discovered along the coast south of Ra's al-Hamra, the site of Ra's al-Khabba could be considered illustrative: KHB-1 after the early discovery by Paolo Biagi in 1987 was investigated with several campaigns from 1999 to 2005 and published in several papers[8] is one of the few fourth millennium BC specialized fishermen campsites along the eastern coast of Oman. The location on a narrow ridge of the coastal cliff next to a wide lagoon explains the attractiveness of resources obtained from the sea or the special environment where marsh water is frequently fed by fresh water of inner wadis.

The excavations recognized six phases of settlement occupation alternated with abandonment episodes marked by layers of inorganic loose sand. The earliest phase belongs to the seventh millennium BC and it is characterized by a moister climate condition. Some post-holes related to huts, few fireplaces and a large pit filled by mussels. Other occupation phases belong to fourth millennium BC and are characterized by several features and structures: circular huts, shelter as wind screens, fireplaces. Few burials complete the archaeological evidence not too different from previous sites. Most of them are located inside older abandoned structures, like a secondary deposition (Grave 1) deposited in a shallow oval pit belonging to phase V and a primary burial (Grave 2), unearthed in interphase II/III, located perfectly in the centre of a circular hut belonging to a previous phase (phase II).

The material culture is mainly represented by fishing tools with an advanced level of specialisation in fishing techniques: stone net sinkers, shell fishhooks, shell lures, together with other tools used in the production of hooks (stone files) and in the preparation of nets (bone needles).

Evaluating the economic activities based on the exploitation of coastal resources (sea and lagoon) and on low level of hunting and pastoralism, it has been suggested to recognize a nomadic nature of the community, moving from the coast to the mountains, exploiting the wadis and mountains resources seasonally from spring to autumn and spending the winter between the coast and the lagoon.[9]

The exploitation of the sea has greatly influenced the maritime attitudes of the Neolithic communities: the successful adaptation of fishermen pushed to increase the confidence with the Ocean, presumably finding the early boat for navigation and opening to the great achievements of exploration confirmed by higher knowledge of astronomical characters as well as of marine currents and winds.

3. The fourth millennium BC

From this outline we can summarize our present knowledge about the settlement pattern of fourth millennium BC: among the foraging societies of Oman, the role of domesticated plants and animals remained marginal, even if we presume higher in the interior. Items of material culture show a remarkable level of integration connected to a unique social system, relied on social cohesion of nuclear families with its members sharing the same living quarters.

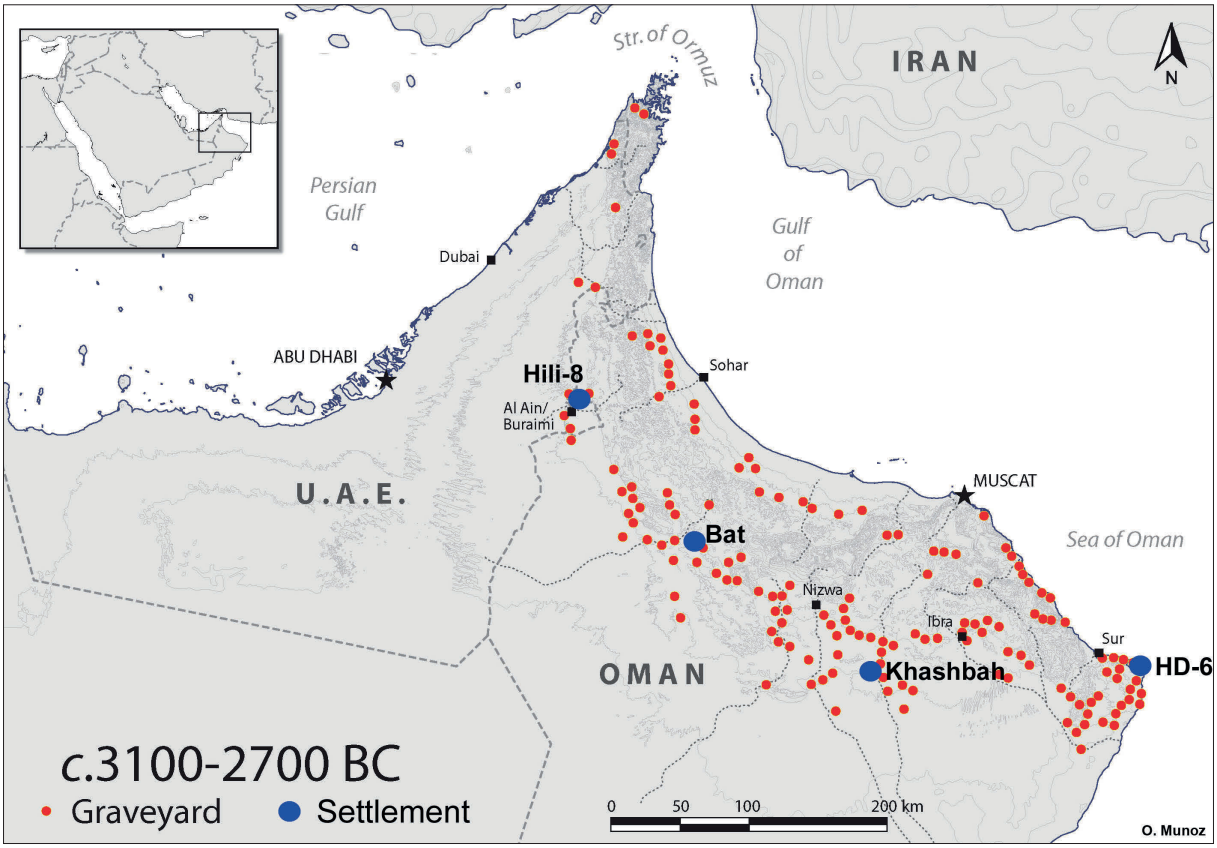
In few millennia, between the Early and the Mid-Holocene, scattered groups of desert hunters turning into food producers were able to extract an accumulative wealth of subsistence resources by developing an interwoven texture of tribal alliances.[10] Wealth accumulation, population density and political complexity were developed along an original and unique evolutionary pathway based on kinship relations of equality that reversed the paradigm of hierarchy and specialization privileged by the settled farmers across the whole Middle East. Compared to great civilizations of Near and Middle East, in South-Eastern Arabia the economical foundations were built upon strategies of intensi-

[8] Cavulli, Scaruffi 2012.

[9] Cavulli, Scaruffi 2013.

[10] Cleuziou 2002, 2005, 2009.

Figure 4
Map of Early Bronze Age 1 sites (3100-2700 BC). Graveyard of Hafit type cairns and settlements (modified from Bortolini, Munoz 2015: fig. 4)



fication and exchange based on kinship instead of kingship, tribal alliances instead of states, classes and royalty.

From the evidence of these coastal sites of the fifth and fourth millennia BC we can recognize the strategies to exploit resources necessary for their subsistence and at the same time the radicated complexity of societal bonds evidenced from collective and individual burials. We suspect that also in the interior, unfortunately less visible in the archaeological record, the same system of communities related to building kinship were developed in the course of the fourth millennium BC. These communities were supported by a parallel development of exploitation of resources both domestic and wild species established along the piedmont aquifers on both slopes of the al-Hajar Mountains and integrated by herding in the steppe-like desert regions of the interior. Most of the few known sites in the interior are therefore related to the presence of semi-mobile pastoral groups who reared sheep, goats, and cattle.[11] So far we presume that the documentation about this period is simply partial and we should expect a higher evidence.

The suspect seems to be confirmed by a demographic increase, connected to an extraordinary spread of collective monumental cairns that characterized the so called Hafit period from the end of fourth through the early third millennium BC, defined also as Early Bronze Age 1 (fig. 4). So far it is debated if this development was due to internal or external factors.

[11] e.g. Uerpmann, Uerpmann 2000; Uerpmann et al. 2012; Lemee et al. 2013.

Since Mesopotamian Ubaid pottery do not go beyond the Gulf area there is no evidence of attested previous interactions with outside, most of the scholars suggest a local and internal development: higher availability of food generates more people and more people mean more work, and more work means more food. It is the time of the Great Transformation[12] with the foundations upon which the Magan Civilization could rise in the third millennium BCE, marked by major development in technology and building social relationships: copper exploitation, mud brick architecture, date palm cultivation and related setting up of oasis system, increase of trade and exchange of technologies. On the other side we cannot exclude the increasing force from Mesopotamia or the Iranian country suggested by some of these new characters. What we can assume is that at the end of fourth millennium BC not only subsistence, but transformation to a social structure based on tribal alliance and enforced by new forms of production and exchange.

Except the archaeobotanic evidence of date palm cultivation there are not many other remains to demonstrate that the oasis system was already activated from the end of fourth to early third millennium BC. Most of the archaeological documentation of this period is related to graveyards and especially from this it appears more and more clear that a significant cultural transformation was establishing in whole Oman.

Some authors[13] explain the poor evidence of settlement remains with the ephemeral nature of occupation related to nomadic pastoralists living in temporary perishable 'campsites'. The numerous cairns spread all over the landscape could represent along this interpretation as markers of tribal territories related to pastoral groups, displaying their control and ownership of grazing lands.[14]

I prefer a different interpretation linked to the adoption of a full oasis-based model of agriculture from very early in the Hafit period,[15] that included sedentary settlements and tombs around them to mark the approaches and to delimit tribal territorial boundaries.[16] The main evidence comes from the very few settlements excavated like Hili 8 in the UAE,[17] Bat,[18] Khashabah[19] in the western piedmont of Omani Hajar and especially from the hamlet of HD-6[20] at Ra's al-Hadd on the easternmost corner of Arabian Peninsula.

The site of Hili, in the piedmont 150 km east of Abu Dhabi, was the early agricultural oasis recorded since the excavations from '70s. Even if the chronology of the earliest phase is debated[21] the cultivation of date palm, various cereals, legumes and fruits,[22] represents the evidence at the end of fourth to early third millennium BC of an already developed agriculture. Possibly included in early phases are some structures for water transformed afterwards in a network of channels and ditches at Hili 8.[23]

At the site of Bat,[24] in the area of Ibri, recent investigations carried out by the American team uncovered structures and archaeological deposit of Hafit period under the later towers of mid of third millennium BC, confirming that the beginning of oases could be fitted earlier.[25] A geomorphological research demonstrated the environment suitable for the development of agriculture along the terraces aligned with wadi Sharsah since the fourth millennium BC, but no evidence of large structures comparable with the later falaj (sloped drain exploiting groundwater up to the surface sometime at long distance) were found so far. Even the hydraulic structure from Bahla, similar to a falaj dated to 3000 BC,[26] remains a fable evidence for the chronological attribution still debated.[27]

The research carried out at Bat suggests an early phase influenced by regular floods managed artifi-

12 Cleuziou 2002.

13 al-Jahwari 2008, pp. 150-151, 2013, p. 163.

14 Deadman 2012; Al-Jahwari 2013b, p. 166.

15 Cleuziou 2002, pp. 200-201.

16 Cleuziou 2007.

17 Cleuziou 1989.

18 Cable 2012; Thornton, Cable, Possehl 2016.

19 Schmidt, Döpper 2017.

20 Cattani, Azzarà 2014.

21 Potts 1990.

22 Cleuziou, Costantini 1980; Tengberg 2003.

23 Charbonnier 2014.

24 Frifelt 1976.

25 Thornton, Cable, Possehl 2016.

26 Orchard, Orchard 2007.

27 Charbonnier 2014.

cially and utilized for irrigation practices, prior to 3100 BC, exploiting especially the water table.[28]

Recent investigations carried out by the German expedition at Khashabah[29] are indicating the presence of a large settlement dated to early third millennium BC, made of large structures comparable with Hili 8 towers. Looking forward for a detailed analysis of the discoveries it appears of extreme importance to extend the evidence towards the eastern side of Oman and especially to find out an intermediate site of Hafit settlement between the western Hajar (Hili 8) and the coast of Arabian Sea, where Ra's al-Hadd is a well-known evidence.

The Early Bronze Age settlement of HD-6 appears to be the most meaningful site to highlight historical and archaeological aspects of a very important step of ancient Ja'alan and, in extended way, of the development of Eastern Arabia civilizations. Radiocarbon datings and archaeological finds fit the chronology of the site between the end of fourth and the beginning of third millennium BC[30] highlighting the significance of three main evidence corresponding to the Great transformation: mud brick architecture, date palm cultivation, copper exploitation.

The settlement is located south of the modern village of Ra's al-Hadd at the end of a low coast where the terrace upraises, continuing southward for several kilometres. The structures are placed on the top of an ancient sand dune next to the entrance of high tide, used probably as harbour, between the seacoast and an inner lagoon.

The main architectural compound can be recognized by a large stone wall interpreted as the foundation of a mud brick wall that surrounded an area of ca. 2500 m^2 with irregular plan, resembling an oval shape with some rectangular outer structures that correspond to enlargements at later phases. The interior is characterized by several architectural blocks including tripartite buildings of mud bricks, frequently placed on the top of a foundation made of stones and mud, interposed with yard with ovens and fireplaces. Some of these blocks belong to different construction phases and the stratigraphic evidence indicates several episodes of transformations, but we can notice that all of them belong to a single project of a closed and protected settlement (fig. 5).

The first occupation is related to a series of huts made from perishable materials, as indicated by postholes, pits and fireplaces cut into the sand dune (Phase 1). Immediately after these ephemeral structures, the stone wall and the mud-bricks buildings start to be constructed, following two main phases characterised by a specific type of mud-brick. The older phase (Phase 2) displays structures made from mud-bricks with a high component of sand, while a second occupation, labelled as (Phase 3), is related to real mud-bricks, with clay of better quality (Figs. 5-6). So far, fourteen buildings with different layouts have been identified; eight of them were completely explored to the floor levels, while the others were excavated only partially.

Analysis of the building plans provides evidence of different constructive patterns within the site. The first one, related to Phase 2, consists of buildings with large and small rooms, some of them related to build a kind of platform similar to later towers in inner Oman. The later pattern is the tripartite building, typical of Phase 3, that consists of a large elongated rectangular room with two or three abutting smaller rooms on each side. The whole complex is usually delimited by a single row of stones with several courses at the base of the outer face. Each building seems devoted to the same domestic and craft activities. The elongated rooms are always characterised by several fireplaces, sometime overlapping each other, demonstrating the lifetime of several activities related presumably to food-processing, associated with tools such as pestles, grinders and querns.

The buildings are part of different compounds, including irregularly shaped open area interposed between houses and the perimetral stone wall and that may be defined as yard. These spaces are clearly independent and mainly connected to their respective building associated: they were used to for a range of domestic activities, including, fish processing activities and accumulating local marine resources or dates imported from the interior locate.

[28] Desruelles et Al. 2016.

[29] Schmidt, Döpper 2017a, 2017b.

[30] Cattani, Cavulli 2004; Azzarà 2009; Cattani, Azzarà in press.

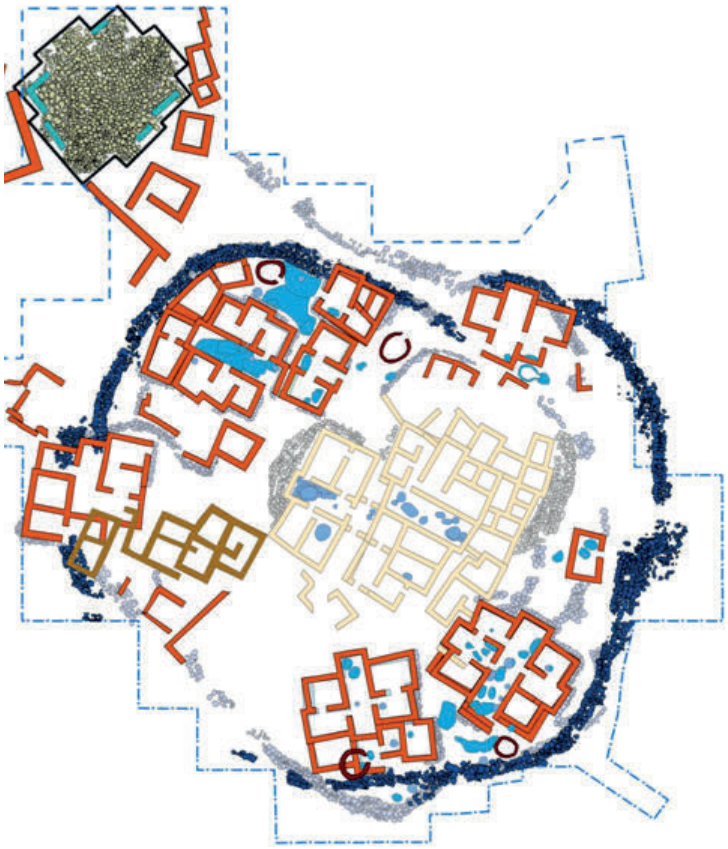


Figure 5
Ra's al.Hadd, HD-6 Settlement.
General plan
(graphic from the author)

Figure 6
Ra's al.Hadd, HD-6 Settlement.
View of building 1
(photo M. Cattani)

Figure 7
Ra's al.Hadd, HD-6 Settlement. Oven next to building 6 (photo M. Cattani)

In the same area were installed fireplaces and a large hearth oven (fig. 7).

The other rooms are either connected to manufactures or meant for storing purposes. Most of the craft activities were not related to a group of specialised people; the great uniformity of the evidence within the buildings indicates that the households shared similar tasks in both daily domestic activities and craft processing of local resources, like shells and stones.[31]

The most significant finds from the excavation are copper objects, flint tools, beads from different materials (stone, shell, enstatite) and several kinds of worked shells, such as discs and inlaid made of motherpearl, conus rings (fig. 8). Very few fragments of pottery indicate that in early third millennium BC pottery was not produced yet, a feature not unusual for most of the contemporary settlements and for burials, where only imported vessels are documented.

The Hafit period corresponds to the development of exploitation of copper.[32] We do not have direct evidence of copper mines dated to the end of fourth millennium BC, but again the findings at HD-6 are the best proof of metal processing. So far, the metal objects from Ra's al-Hadd HD-6 are the best-known archaeological metal complex from the

[31] Azzarà 2009; Cattani, Cavulli 2004.

[32] Hauptmann, Weisgerber, Bachmann 1988; Prange et Al. 1997.

Figure 8
Ra's al.Hadd, HD-6 Settlement. Worked shell finds and necklaces (photo Joint Hadd Project)

Figure 9
Ra's al.Hadd, H D-6 Settlement. Metal finds (photo Joint Hadd Project)

Hafit period.[33] There is no evidence of casting activities and copper artefacts, mainly devoted to fishing activities, were manufactured in situ only hammering or cutting the imported ingots in small blocklets. Metal objects were widely used for daily activities such as fishing and knitting, as indicated by fish-hooks, pins, obtained through cold hammering of copper ingots (fig. 9).

The productions of rings and pendants made from Conus and Pinctada margaritifera has been attested within all the excavated structures. The different stages of the chaîne opératoire are documented by finished Conus rings and ornaments made from mother of pearl, a series of broken or incomplete rings and pendants, apexes and fragments in course of processing and number of wastes and discarded body whorls.

[33] Giardino 2017.

The main household activity was the manufacture of beads, based on a variety of raw materials and the setting of complete necklaces and bracelets. Most of the production derived from shells and steatite softstone, but other stone materials such as quartz, pyrophyllite, crystal rock, alabaster and jasper were used as well. The complete *chaîne opératoire* of bead making is represented: together with finished objects, finds include blocks and rods of different raw material, flakes and wastes. All households had specific spaces related to bead manufacture, as demonstrated by large amounts of waste products and unfinished objects.

Large quantities of beads were produced from synthetic enstatite, an artificial material obtained through the hardening of soapstone baked up to 1100 °C.[34] In addition, large quantities of beads made from chlorite softstone, most likely not produced in situ, as suggested by the lack of any trace of processing, have been recorded within all the excavated contexts.

The subsistence was based mainly on marine resources: rich deposits of fish bones attest inshore and pelagic species, with a large predominance of Scombridae, such as *Euthynnus affinis* (kawakawa), *Thunnus tonggol* (longtail tuna) and *Thunnus albacares* (yellowfin tuna); taxa represented include also *Carangidae* (jacks and trevallies), *Lethrinida*e (emperors) and *Haemulidae* (grunts), together with a smaller number of other species.[35] Sharks, and green turtles were also part of the exploited species, both for the nutritional qualities of their flesh and for the value of their by-products such as leather, fat and carapaces. The consumption of dolphins, attested by huge quantities, is still doubtful but could confirm the requirement of fat (essential in preventing protein poisoning within the diet of non-agrarian communities). Also molluscs and crustaceans, such as *mytilidae* in large quantity, urchins and crabs, played a significant role in the diet.

Processing of marine fauna was related to a series of fire-structures such as large earth ovens. Each household probably provided its own daily meal, as suggested by the presence of several indoor hearths connected to the processing of small fish and molluscs in every dwelling, and by small fireplaces located in the courtyards, but the most significant evidence is represented by large ovens (up to 2 metres in diameter), probably used for the processing of large marine species and large amounts of other fishes to be smoked or dried to preserve and probably to exchange and send to other communities in the interior. According to ethnography, marine resources represented the main protein supply for all traditional communities in Oman, regardless of their environment and level of social organisation.[36]

In the exchange network involving inland and coastal communities, fishermen provided smoked and dried fish while acquired dates and other farming products from the oases in the interior. The large amount of charred stone dates found from layers since earliest phases dating to the end of fourth millennium BC are the best proof of the connection with oases developing in the interior of Oman at the same time with date palms and water management structures.

It is possible that HD-6 and contemporary sites responded to similar economic and social patterns, based on the interdependency of complementary groups.

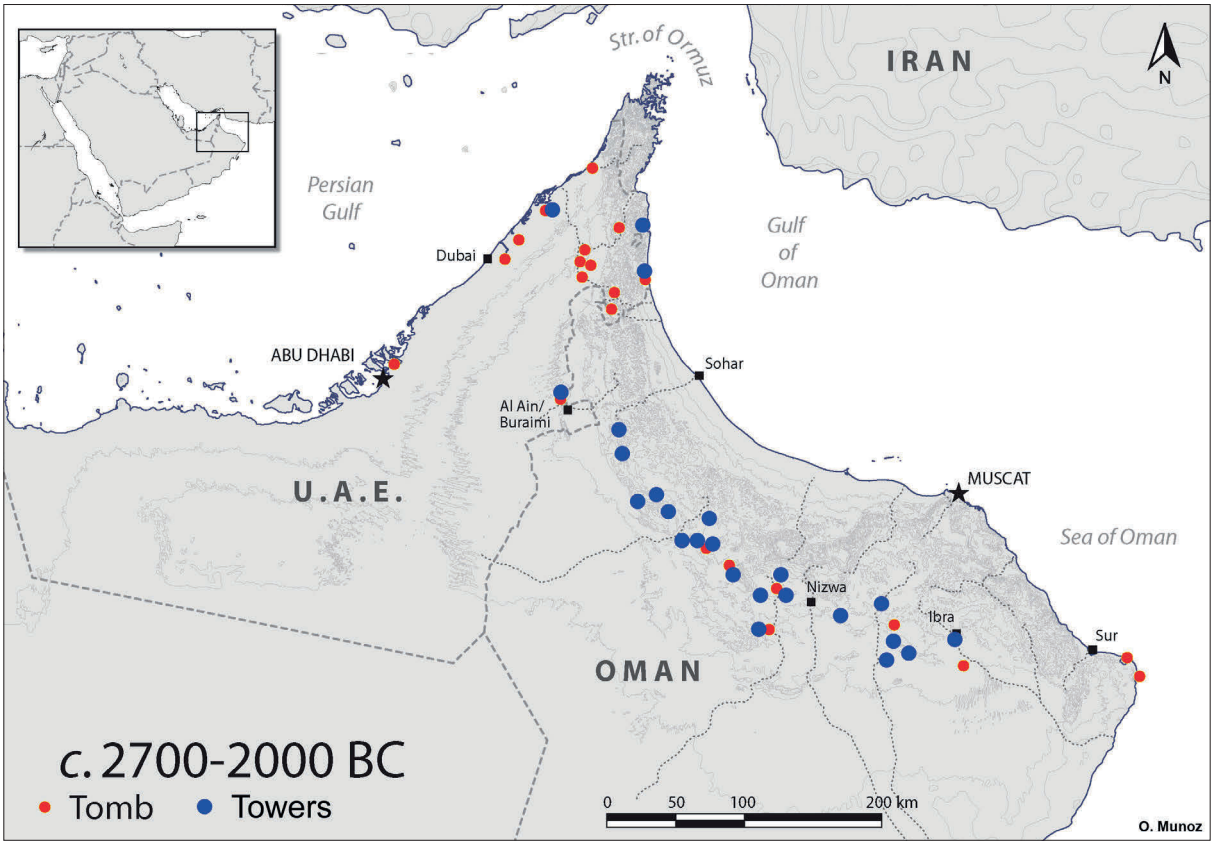
At the light of the results of the excavation, the settlement of HD-6 can be considered as the earliest evidence of the transformation in the social system in Oman. Social complexity is reflected by the archaeological record: a range of new technologies especially in pyrotechnology (metalworking, manufacture of synthetic enstatite), architecture of mudbricks with standard units and processing of high quality, craft-specialisation committed not only for local exploitation, but also for trading with the production of a surplus. All these activities and knowledge background are shared by the entire population as unifying choice to be involved as a community at a larger level who decided to build and live together. At the same time the arrangement of architectural units, each of them kept accurately independent, indicates the presence of families with relationships based probably on kinship. The same corporate tribal configuration seems to be confirmed by several groups of cairns spread on the terraces around the

[34] Panei, Rinaldi, Tosi 2005.

[35] Kerneur 2007; Tosi et Al. 2001.

[36] El Mahi 2001.

Figure 10
Map of Early Bronze Age 2 sites (2600-2000 BC). Umm an-Nar tombs and towers (modified from Bortolini, Munoz 2015: fig. 5)



site, looking at and at the same time clearly visible from the settlement. According to the size of the site, an estimate of up to 200 inhabitants, seasonally even more, could represent the real transformation comparing to previous demographic configuration of foragers expected for the Middle Holocene.

The settlement of Ra's al-Hadd is therefore providing the proof of strong changes that involved the Eastern Arabia from the end of fourth millennium BC, confirming that this process was extended in the whole region of piedmont. HD-6 is presumably a simple projection of the revolutionary outcome of the Great Transformation for prehistoric Oman was rising: the establishment of the oases as centers of aggregation, true demographic complexes where people and plants could be concentrated once the supply of water could be granted by irrigation works, exploiting great quantities of water naturally dispersed in a vast network of seasonal river flows or in subterranean mountain aquifers. The oasis systems ensured the possibility to expand economic activities in new sectors for production and exchange: from food production, including cultivation of dates, cereals and dairies, to a whole range of craft activities, related especially to copper mining and stone quarrying. The growth of these new sectors was necessarily related to the exchange, hence to the demand for local resources by surrounding and distant countries.

We do not know if this process originated elsewhere and was imported as a whole system in Oman, but what seems verified is the involvement of local population, taking part more and more into a web of long-distance exchanges from the interior to the coast and from the coast to other countries by the end of the fourth millennium BC.

At the half of third millennium BC, the process seems to be completed and directed to a turning point in the organization of production and in the social system.

From at least the mid of the millennium or something earlier in the piedmont of inner Oman the earliest settlements transform in huge oases with typical monumental buildings of stone towers (fig.10). Each of investigated area usually shows a group of towers (from 3 to 6) different in architectural details but all corresponding to a similar dimension, with a diameter between 20 and 24 m.

About the meaning of these monuments, it appears clear that the symbolic role is one of the most winning interpretation. No specific ritual function, not supported by other evidence, not enough to imagine as defensive structure alone, neither to protect goods or to protect chief of the society. Besides these hypotheses it is necessary to stress their role in economic and social changes that contributed to enlarge production or define specialization, increase population, and especially to wide interactions. The key points again are stressing the availability of resources, the adaptation to a different social system and the capability to exploit material in order to make all the country particularly active: water to produce food and sustain people, copper to create wealth, exchange to create profit and prosperity.

Corresponding to the Umm an-Nar period, that I prefer to call Early Bronze Age 2, the second half of third millennium BC is clearly a period marked by a huge exploitation and trade of metal, according Mesopotamian texts and archaeological evidence. To exploit metal, it was necessary to sustain people and to produce enough food in a more arid climate it required to invent constant water supply in arable lands. At this moment the need to assure water for humans, animals and soil became priority that pushed to create canalization, the earliest version of falaj.

In the oases in the interior a huge mass of food was produced, the interaction with the exploitation of other resources already established since centuries increased and strengthened the tribal relationships in controlling wealth and especially the way to carry out these operations. At a certain point, it corresponded to the explosion of long-distance trade, importing precious stones, presumably different food and especially, since we know from Mesopotamian sources, prestigious tissues. This outline corresponds to the rise of early complex polities who decided to show themselves with their impressive towers[37] and with monumental tombs magnificently built with accurate stone faces.

Figure 11
Ra's al-Jins, RJ-2. View of room 1 of building 1 with bitumen storage and infant burial (photo M. Cattani)

Not surprisingly the Eastern Arabian oases came into being as a product of social complexity, together with the cultural integration that unified in vast regions the different compartments of specific adaptive pathways, mentioned in the cuneiform sources of Mesopotamia during the second half of the third millennium BC with the name of Magan as a country beyond the Inferior Sea, as a respected trade partner of the Sumerian cities.[38]

[37] Cattani et Al. 2017; Cocca et Al. 2019.

[38] Laursen, Steinkeller 2017.

4. Concluding remarks

The evolution of civilization in Oman was very different, respect to other countries.[39] While regions along the alluvial corridors irrigated by the Nile, the Euphrates-Tigris twin courses and the Indus floodplain raised the complexity of their societies on hierarchies and royalty in order to administrate the accumulated wealth from vast food reserves, the common foundations of ancient Arabian society were built on tribal kinship developing a unique different civilisation. Monumentality was representing these bonds among individuals and families through the tower building and the turret cairns, from early third millennium BC with Hafit type to the second half of third millennium BC with larger and more articulated Umm an-Nar tombs. These burials, usually closer to the settlements, present many structural innovations: larger diameter and lower height; inner partitions, dividing the tomb in two or more chambers; greater structural articulation and different access; more accurate external covering with different material. These new tombs seem to have contained about 150 individuals buried with more complex rituals: skeletons were removed, dismembered and burnt with many ornaments, periodically some bones were removed and disposed in external pits or underground chambers with offerings. The entrance too becomes monumental with specially worked stones placed above the ground level.[40]

The same cultural evidence are spread from the Gulf to the easternmost side toward the Ocean. Here, the excavations at Ra's al-Jins[41] and at Ra's al-Hadd[42] are attesting the intense relationship with the other side of the Ocean.

The significance of exchange and interaction between the Indus Civilization and Umm an-Nar communities has often been discussed in the general context of local economic and sociotechnical developments in the Oman Peninsula. Interactions with Indus seafaring merchants are attested by numerous fragments of Indus black slipped jars[43] and other imports of precious objects (ivory, carnelian and other stones).

[39] Cleuziou, Tosi 2007, Magee 2014.

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